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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,751	07/10/2003	Peter W. Lee	AP99-002B	2335
7590	03/17/2004		EXAMINER	
George O. Saile 28 Davis Avenue Poughkeepsie, NY 12603			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/616,751

Applicant(s)

LEE ET AL.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This action is a first Office action on the merits of Application Serial No. 10/616,751, which is a divisional of Application Serial No. 09/531,787 filed on 21 March 2000, now US Patent 6,660,585. Currently, claims 1-6 are pending.

#### *Drawings*

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the double diffused drain and large tilted implanted drain recited in claim 5 must be shown or the features canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

#### *Claim Objections*

3. *Claims 2-4 and 6 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.* The claims do not further limit the structure of the device in claim 1, but merely recite an intended use. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form.

#### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. *Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.*

The specification does not provide support for the substitution of the lightly doped drain with one of a double diffused drain or a large angle tilted implanted drain.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. *Claims 5 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Claim 5 recites the limitation "wherein a double diffused drain or a large angle tilted implanted drain can be used in place of said lightly doped drain." Claim 1, from which claim 5 depends, clearly recites a lightly doped drain ion implanted into said substrate on drain side of said stacked gate (claim 1, line 5). The lightly doped drain cannot be substituted with a double diffused drain or a large angle tilted implanted drain in a dependent claim.

Claim 5 recites the limitation "wherein a double diffused drain or a large angle tilted implanted drain can be used in place of said lightly doped drain." Claim 6 recites the limitation "wherein a high drain voltage can be used to increase read current." The phrase "can be used" renders both claims indefinite, since it is unclear whether the limitation is or is not required. For example, with respect to claim 5, it is unclear whether a double diffused drain or a large tilted implanted drain is required or is not required. The claim recites that one or the other *can be used* in place of the lightly doped drain, but does not recite that one or the other *is used* in place of the lightly doped drain.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. *Claims 1-4 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Prall et al. (US 5,345,104).*

The Prall et al. patent (Prall) discloses a stacked gate flash memory cell (figs. 1, 2, and accompanying text). The stacked gate flash memory cell comprises the following elements: a floating gate 14 on top of a gate oxide 13 on a semiconductor substrate 12 (fig. 1, col. 3, lines 20-32, and col. 18-19), a control gate 16 on top of the floating gate separated by an insulating material 15 and forming a stacked gate (fig. 1, col. 3, lines 20-

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32, and col. 18-19), a lightly doped drain 18 formed in the substrate on the drain side of the stacked gate (fig. 1 and col. 3, lines 55-59), a heavily doped source 20 is formed in the substrate on source side of the stacked gate (fig. 1 and col. 4, lines 1-11), sidewall spacers 23 formed on sides of the stacked gate (fig. 2 and col. 4, lines 12-19), a heavily doped drain 24 formed in the substrate adjacent to sidewall spacer on drain side of the stacked gate (fig. 2 and col. 4, lines 19-27).

The stacked gate memory cell further comprises a double-diffused source 20, 21, as recited in claim 3 (fig. 1 and col. 4, lines 1-11).

Since the only alleged distinction between claims 2-4 and 6 and Prall is recited in "intended use" language, it is incumbent upon Applicant to show that the prior art does not possess the recited functions (*In re Ludtke* 169 USPQ 563, 567 (CCPA 1971)).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. *Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Prall in view of Wolf (Silicon Processing for the VLSI Era – Vol. 3).*

Prall does not teach the use of a double diffused drain or a large angle tilted implanted drain in place of the lightly doped drain. However, Wolf teaches both the

use of a double diffused drain in place of a lightly doped drain (section 9.5 - page 587, 5<sup>th</sup> paragraph and section 9.5.2, pages 588-590) and the use of a large angle tilted implanted drain in place of lightly doped drain (section 9.12 - page 623, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs and section 9.12.2, pages 630-634).

Wolf teaches the use of graded drain regions to reduce the hot carrier degradation (section 9.5 - page 586, 1<sup>st</sup> paragraph). A graded drain region is created in one of two ways: using a double diffused drain, or using a lightly doped drain (page 587, 5<sup>th</sup> paragraph). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use a double diffused drain in place of the lightly doped drain, as taught by Wolf, since both the lightly doped drain and the double diffused drain are used in semiconductor device fabrication to reduce hot carrier degradation in MOSFET structures.

Wolf teaches that a lightly doped drain structure in a MOSFET structure with the gate fully overlapping the n<sup>-</sup> structure is the optimum structure with respect to hot-carrier resistance and drive current performance (section 9.12 - page 623, 1<sup>st</sup> paragraph). However, this structure is difficult to fabricate in submicron devices using the conventional oxide-spacer-based lightly doped drain approach (page 623, 1<sup>st</sup> paragraph). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to replace the lightly doped drain with a large angle tilted implanted drain, as taught by Wolf, since the large angle tilted implanted drain

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provides a fully overlapped lightly doped drain that is not difficult to fabricate in submicron devices.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*JMJ*

03 March 2004

  
AMIR ZARABIAN  
SUPERVISORY PATENT EXAMINER  
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